5.3 AIR QUALITY

This section summarizes the existing regional air quality conditions, describes the regulatory framework, and discusses potential impacts to air quality as a result of implementation of the proposed project. The following document was used to analyze the potential impacts from the proposed project:

- *Air Quality Assessment, Quarry Creek Mixed Use Development*, Ldn Consulting, Inc. (Appendix G of this EIR).

The technical appendices are included on the attached CD found on the back cover of this Environmental Impact Report (EIR). Additional background information was also gathered from the City of Carlsbad General Plan.

5.3.1 Existing Conditions

Climate

The project site is located in the northeastern portion of the City of Carlsbad, just south of State Route 78 (SR-78). The site is generally represented by a diverse topography with elevations ranging from 80 feet to approximately 320 feet above mean sea level. Currently, the 100-acre Reclamation parcel is mostly disturbed, and the 56-acre Panhandle parcel is relatively undisturbed. Land uses surrounding the project site are mostly residential north of SR-78 and also to the south, commercial to the east, and open space to the west.

The City of Carlsbad is located in the San Diego Air Basin (SDAB). Climate within the SDAB area often varies dramatically over short geographical distances with cooler temperatures on the western coast gradually warming to the east as prevailing winds from the west heats up. Most of southern California is dominated by high-pressure systems for much of the year, which keeps San Diego mostly sunny and warm. Typically, during the winter months, the high pressure system drops to the south and brings cooler, moister weather from the north. It is common for inversion layers to develop within high pressure areas, which mostly define pressure patterns over the SDAB. These inversions are caused when a thin layer of the atmosphere increases in temperature with height. An inversion acts like a lid preventing vertical mixing of air through convective overturning.

Meteorological trends within the Carlsbad area generally are very similar to that of nearby Oceanside where daytime highs typically range between 66º Fahrenheit (F) in the winter to approximately 79ºF in the summer with August usually being the hottest month. Median temperatures range from approximately 55ºF in the winter to approximately 72ºF in the summer. The average humidity is approximately 66 percent in the winter and about 73 percent in the summer[1]. Carlsbad usually receives approximately 10.4 inches of rain per year with February usually being the wettest month[2].

Major Air Pollutants

Air quality is defined by ambient air concentrations of specific pollutants, known as "criteria" pollutants, determined by the Environmental Protection Agency (EPA) with respect to the public's health and welfare. The subject pollutants, which are monitored by the EPA, are carbon monoxide (CO), sulfur

[1] http://www.city-data.com/city/Carlsbad-California.html
[2] http://www.weather.com /weather/wxclimatology/monthly/graph/USCA0182

dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), and respirable 10- and 2.5-micron particulate matter (PM), volatile organic compounds (VOCs), reactive organic gasses (ROG), hydrogen sulfide (H_2S), sulfates, lead (Pb), and visibility reducing particles. These pollutants are defined below:

Carbon Monoxide: CO is a colorless, odorless, and tasteless gas and is produced from the partial combustion of carbon-containing compounds, notably in internal-combustion engines. Carbon monoxide usually forms when there is a reduced availability of oxygen present during the combustion process. Exposure to CO near the levels of the ambient air quality standards can lead to fatigue, headaches, confusion, and dizziness. CO interferes with the blood's ability to carry oxygen.

Sulfur Dioxide: SO_2 is a gaseous compound of sulfur and oxygen and is formed when sulfur containing fuel is burned by mobile sources, such as locomotives, ships, and off-road diesel equipment. SO_2 is also emitted from several industrial processes, such as petroleum refining and metal processing. Effects from SO_2 exposures at levels near the one-hour standard include broncho-constriction accompanied by symptoms, which may include wheezing, shortness of breath and chest tightness, especially during exercise or physical activity. Children, the elderly, and people with asthma, cardiovascular disease or chronic lung disease (such as bronchitis or emphysema) are most susceptible to these symptoms. Continued exposure at elevated levels of SO_2 results in increased incidence of pulmonary symptoms and disease, decreased pulmonary function, and increased risk of mortality.

Nitrogen Dioxide: NO_2 is a reactive, oxidizing gas capable of damaging cells lining the respiratory tract and is one of the nitrogen oxides emitted from high-temperature combustion, such as those occurring in trucks, cars, power plants, home heaters, and gas stoves. In the presence of other air contaminants, NO_2 is usually visible as a reddish-brown air layer over urban areas. NO_2, along with other traffic-related pollutants, is associated with respiratory symptoms, respiratory illness and respiratory impairment. Studies in animals have reported biochemical, structural, and cellular changes in the lung when exposed to NO_2 above the level of the current state air quality standard. Clinical studies of human subjects suggest that NO_2 exposure to levels near the current standard may worsen the effect of allergens in allergic asthmatics, especially in children.

Ozone: O_3 is a highly oxidative unstable gas capable of damaging the linings of the respiratory tract. This pollutant forms in the atmosphere through reactions between chemicals directly emitted from vehicles, industrial plants, and many other sources. Exposure to ozone above ambient air quality standards can lead to human health effects such as lung inflammation, tissue damage and impaired lung functioning. Ozone can also damage materials such as rubber, fabrics and plastics.

Particulate Matter: PM_{10} or $PM_{2.5}$ is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary in shape, size and chemical composition, and can be made up of multiple materials such as metal, soot, soil, and dust. PM_{10} particles are 10 microns (μm) or less and $PM_{2.5}$ particles are 2.5 micrograms per meter (μm) or less. These particles can contribute significantly to regional haze and reduction of visibility in California. Exposure to PM levels exceeding current air quality standards increases the risk of allergies such as asthma and respiratory illness.

Volatile Organic Compounds, Reactive Organic Gases: Volatile organic compounds (VOCs) and Reactive organic gases (ROGs) are hydrocarbon compounds (any compound containing various combinations of hydrogen and carbon atoms) that exist in the ambient air. VOCs contribute to the formation of smog and/or may themselves be toxic. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints. ROG is similar to VOC and is also a precursor

pollutant in forming O_3. ROG consists of compounds containing methane, ethane, propane, butane, which are typically the result of some type of combustion/decomposition process. Smog is formed when ROG and NO_x react in the presence of light.

Hydrogen Sulfide: Hydrogen sulfide (H_2S) is a colorless, flammable, poisonous compound. It often results when bacteria break down organic matter in the absence of oxygen. High concentrations of 500-800 parts per million (ppm) can be fatal and lower levels cause eye irritation and other respiratory effects.

Sulfates: Sulfates are an inorganic ion that is generally naturally occurring and is one of several classifications of minerals containing positive sulfur ions bonded to negative oxygen ions.

Lead: Lead (Pb) is a potent neurotoxin that accumulates in soft tissues and bone over time. The major sources of lead emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. Because lead is only slowly excreted, exposures to small amounts of lead from a variety of sources can accumulate to harmful levels. Effects from inhalation of lead near the level of the ambient air quality standard include impaired blood formation and nerve conduction. Lead can adversely affect the nervous, reproductive, digestive, immune, and blood-forming systems. Symptoms can include fatigue, anxiety, short-term memory loss, depression, weakness in the extremities, and learning disabilities in children.

Visibility Reducing Particles: Visibility reducing particles (VRPs) are small particles that occlude visibility and/or increase glare of haziness.

Local Air Quality

Criteria pollutants are measured continuously throughout the San Diego Air Basin. This data is used to track ambient air quality patterns throughout the County. As mentioned below, this data is also used to determine attainment status when compared to the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS). The NAAQS and CAAQS are discussed in greater detail below in the regulatory setting.

The San Diego Air Pollution Control District (SDAPCD) is responsible for monitoring and reporting monitoring data. The SDAPCD operates 10 monitoring sites, which collect data on criteria pollutants. The proposed development project is closest to the Camp Pendleton and East Valley Parkway monitoring stations which are located approximately 5.8 and 13.9 miles from the project site, respectively. Table 5.3-1 identifies the criteria pollutants monitored at the aforementioned station.

Four additional sites collect meteorological data which is used by the SDAPCD to assist with pollutant forecasting, data analysis and characterization of pollutant transport. The SDAPCD publishes the five year air quality summary for all of the monitoring stations within the SDAB.

Sensitive Receptors

High concentrations of air pollutants pose health hazards for the general population, but particularly for the young, the elderly and the sick. Typical health problems attributed to smog include respiratory ailments, eye and throat irritations, headaches, coughing, and chest discomfort. Currently, no sensitive receptors such as schools, parks, hospitals, convalescent homes, or nursing homes are located within project site.

Table 5.3-1. Three Year Ambient Air Quality Summary

Pollutant	Closest Recorded Ambient Monitoring Site	Averaging Time	CAAQS	NAAQS	Year		
					2009	2010	2011
O_3 (ppm)	21441 West B Street Camp Pendleton	1 Hour	0.09 ppm	--	0.09	0.092	0.085
	21441 West B Street Camp Pendleton	8 Hour	0.070 ppm	0.075 ppm	0.076	0.78	0.71
PM_{10} (ug/m^3)	600 E Valley Parkway Escondido, CA	24 Hour	50 ug/m^3	150 ug/m^3	75	43	40
	600 E Valley Parkway, Escondido, CA	Annual Arithmetic Mean	20 ug/m^3	--	24.6	21	18.8
$PM_{2.5}$ (ug/m^3)	21441 West B Street Camp Pendleton	24 Hour	--	35 ug/m^3	26.9	26.1	30.7
NO_2 (ppm)	21441 West B Street Camp Pendleton	Annual Arithmetic Mean	0.030 ppm	0.053 ppm	0.01	0.008	0.007
	21441 West B Street Camp Pendleton	1 Hour	0.18 ppm	--	0.068	0.081	0.066
CO (ppm)	600 E Valley Parkway Escondido CA	8 Hour	9 ppm	9 ppm	3.24	2.46	2.2

Source: http://www.arb.ca.gov/adam/topfour/topfourdisplay.php

The Kinder Care Learning Center, Pacific Place, Emeritus and Merrill Gardens retirement homes are located approximately 0.24 miles east of the project site and Hope Elementary School is located approximately 0.42 miles south of the project site. Additionally, residential uses are located to the south and Larwin Park is located less than one-quarter mile west of the project site. Tri-City Medical Center, Mira Costa College, and ABC Children's Center are located just over one-half mile of the project site to the east, north, and west respectively. Residential areas are located north of the project site, north of SR-78.

5.3.2 Regulatory Setting

Federal Clean Air Act

The Federal Air Quality Standards were developed per the requirements of the Federal Clean Air Act, which is a federal law that was passed in 1970 and further amended in 1990. This law provides the basis for the national air pollution control effort. An important element of the act included the development of national ambient air quality standards for major air pollutants.

The Clean Air Act established two types of air quality standards otherwise known as primary and secondary standards. Primary Standards set limits for the intention of protecting public health, which includes sensitive populations such as asthmatics, children, and the elderly.

Secondary standards set limits to protect public welfare to include the protection against decreased visibility, damage to animals, crops, vegetation and buildings. The EPA Office of Air Quality Planning and Standards (OAQPS) has set NAAQS for criteria pollutants.

State Air Resources Board

The State of California Air Resources Board (CARB) sets the laws and regulations for air quality on the state level. The CAAQS are either the same as or more restrictive then the NAAQS and also restrict four additional contaminants. Table 5.3-2 identifies both the NAAQS and CAAQS.

Regional Standards

The State of California has 35 specific air districts, each responsible for ensuring that the criteria pollutants are below the NAAQS and CAAQS. Air basins that exceed either the NAAQS or the CAAQS for any criteria pollutants are designated as "non-attainment areas" for that pollutant. Currently, there are 15 non-attainment areas for the federal ozone standard and two non-attainment areas for the $PM_{2.5}$ standard. The state, therefore, created the California State Implementation Plan (SIP), which is designed to provide control measures needed for California Air basins to attain ambient air quality standards.

The SDAPCD is the government agency which regulates sources of air pollution within San Diego County. The SDAPCD developed a Regional Air Quality Strategy (RAQS) to provide control measures to try to achieve attainment status. Currently, the San Diego Air Basin is in "non-attainment" status for federal O_3 and the State PM_{10} and $PM_{2.5}$ however, an attainment plan is only available for O_3. The RAQS was adopted in 1992 and has been updated as recently as 2009 which was the latest update incorporating minor changes to the prior 2004 update.

The RAQS is largely based on population predictions by the San Diego Association of Governments (SANDAG). Projects that produce less growth than predicted by SANDAG would generally conform to the RAQS and projects create more growth than projected by SANDAG may create a significant impact assuming the project produces unmitigated emission generation in excess of the regional standards. Also the project would be considered a significant impact if the project produces cumulative impacts.

The 2009 update mostly clarifies and enhances emission reductions by implementing new VOC and NO_x reduction measures. The criteria pollutant standards are generally attained when each monitor within the region has had no exceedances during the previous three calendar years. A complete listing of the current attainment status with respect to both federal and state nonattainment status by pollutants for San Diego County is shown in Table 5.3-3.

Table 5.3-2. California and Federal Ambient Air Quality Standards

Pollutant	Average Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)	1 Hour	0.09 ppm (180 ug/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 ug/m^3)		0.075 ppm (147 ug/m^3)		
Respirable Particulate Matter (PM_{10})	24 Hour	50 ug/m^3	Gravimetric or Beta Attenuation	150 ug/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 ug/m^3		—		
Fine Particulate Matter ($PM_{2.5}$)	24 Hour	No Separate State Standard		35 ug/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 ug/m^3	Gravimetric or Beta Attenuation	15.0 ug/m^3		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10 mg/m^3)	Non-dispersive Infrared Photometry	9 ppm (10 mg/m^3)	None	Non-dispersive Infrared Photometry
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2)[8]	Annual Arithmetic Mean	0.030 ppm (57 ug/m^3)	Gas Phase Chemiluminescence	0.053 ppm (100 ug/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (339 ug/m^3)		0.100 ppm (see Footnote 8)		
Sulfur Dioxide (SO_2)[9]	1 Hour	0.25 ppm (655 ug/m^3)	Ultraviolet Fluorescence	75 ppb (196 ug/m^3)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 ug/m^3)	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[9]	—	
	24 Hour	0.04 ppm (105 ug/m^3)		0.14 ppm (for certain areas)[9]	—	
Lead[10,11]	30 Days Average	1.5 ug/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 ug/m^3 (for certain areas)[11]	Same as Primary Standard	
	Rolling 3-month Average [10]	—		0.15 ug/m^3		

Pollutant	Average Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Visibility Reducing Particles[12]	8 Hour	See footnote 12		No Federal Standards		
Sulfates	24 Hour	25 ug/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 ug/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[10]	24 Hour	0.01 ppm (26 ug/m^3)	Gas Chromatography			

Source: California Air Resources Board (06/07/12)

Notes:

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m^3 is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.
8. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
9. On June 2, 2010, a new 1-hour SO2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved. Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
10. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
11. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
12. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

Table 5.3-3. San Diego County Air Basin Attainment Status by Pollutant

Pollutant	Average Time	California Standards	Federal Standards
Ozone (O_3)	1 Hour	Non-attainment	No Federal Standard
	8 Hour		Basic Non-attainment
Respirable Particulate Matter (PM_{10})	24 Hour	Non-attainment	Unclassified[1]
	Annual Arithmetic Mean	No State Standard	Unclassified[2]
Fine Particulate Matter $PM_{2.5}$	24 Hour	No State Standard	Attainment
	Annual Arithmetic Mean	Non-attainment	Attainment
Carbon Monoxide (CO)	8 hour	Attainment	Maintenance Area[3]
	1 hour		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	No State Standard	Attainment
	1 Hour	Attainment	No Federal Standard
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	No State Standard	Attainment
	24 Hour	Attainment	Attainment
	1 Hour	Attainment	No Federal Standard
Lead (Pb)	30 Day Average	Attainment	No Federal Standard
	Calendar Quarter	No State Standard	Attainment
Visibility Reducing Particles	8 Hour (10AM to 6PM, PST)	Unclassified	No Federal Standard
Sulfates	24 Hour	Attainment	No Federal Standard
Hydrogen Sulfide	1 Hour	Unclassified	No Federal Standard

Source: Air Quality Assessment 2012

1. Data reflects status as of March 19, 2009.
2. Unclassified; indicates data are not sufficient for determining attainment or nonattainment.
3. Maintenance Area (defined by U.S. Department of Transportation) is any geographic region of the United States previously designated nonattainment pursuant to the CAA Amendments of 1990 and subsequently redesignated to attainment subject to the requirement to develop a maintenance plan under Section 175A of the CAA, as amended.

5.3.3 Project Impacts

5.3.3.1 Thresholds of Significance

As defined in Appendix G of the *California Environmental Quality Act (CEQA) Guidelines*, project impacts to air quality would be considered significant if the project was determined to:

- Result in emissions that would violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Expose sensitive receptors (including, but not limited to, schools, hospitals, resident care facilities, or day care centers) to substantial pollutant concentrations;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (PM_{10}, $PM_{2.5}$ or exceed quantitative thresholds for O_3 precursors, NO_x and VOCs);

- Conflict with or obstruct implementation of the San Diego RAQS or applicable portions of the SIP; or
- Create objectionable odors affecting a substantial number of people?

SDAPCD Rule 20.2 – Air Quality Impact Assessment Screening Thresholds

The SDAPCD has established thresholds in Rule 20.2 for new or modified stationary sources; however, the City's or County's Guidelines for Determining Significance should be used for Air Quality Impact Assessments (AQIA) for determining CEQA impacts. These screening criteria can be used to demonstrate that a project's total emissions would not result in a significant impact as defined by CEQA. Also, since SDAPCD does not have an air quality impact threshold for VOCs, it is acceptable to use the Coachella Valley VOC threshold from South Coast Air Quality Management District (SCAQMD). Should emissions be found to exceed these thresholds, additional modeling is required to demonstrate that the project's total air quality impacts are below the state and federal ambient air quality standards. These screening thresholds for construction and daily operations are shown in Table 5.3-4.

Table 5.3-4. Thresholds of Significance for Air Quality Impacts

Pollutant	Thresholds Significance (Pounds Per Day)[2,3]	Clean Air Act Less than Significant Levels (Tons Per Year)
Carbon Monoxide (CO)	550	100
Oxides of Nitrogen (NO_x)	250	50
Oxides of Sulfur (SO_x)	250	100
Particulate Matter (PM_{10})	100	100
Particulate Matter ($PM_{2.5}$)	55	100
Volatile/Reactive Organic Compounds & Gasses (VOC/ROG)[1]	75	50

Source: SDAPCD Rule 1501, 20.2(d)(2), 1995; EPA 40CFR93, 1993

1. Threshold for VOCs based on the threshold of significance for reactive organic gases from Chapter 6 of the CEQA Air Quality Handbook of the South Coast Air Quality Management District.
2. Thresholds are applicable for either construction or operational phases of a project action.
3. The PM2.5 threshold is based upon the proposed standard identified in the "*Final—Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds,*" published by SCAQMD in October 2006.

Non-criteria pollutants such as Hazardous Air Pollutants (HAPs) or Toxic Air Contaminants (TACs) are also regulated by the SDAPCD. Rule 1200 (Toxic Air Contaminants – New Source Review) adopted on June 12, 1996, requires evaluation of potential health risks for any new, relocated, or modified emission unit which may increase emissions of one or more toxic air contaminants. The rule requires that projects that propose to increase cancer risk to between 1 and 10 in one million need to implement toxics best available control technology (T-BACT) or impose the most effective emission limitation, emission control device or control technique to reduce the cancer risk. At no time shall the project increase the cancer risk to over 10 in one million. Projects creating cancer risks less than one in one million are not required to implement T-BACT technology.

The U.S. Environmental Protection Agency (U.S. EPA) uses the term VOCs and CARB's Emission Inventory Branch (EIB) uses the term ROGs to essentially define the same thing. There are minor deviations between compounds that define each term; however, for the purposes of this study it is assumed that they are essentially the same due to the fact SCAQMD interchanges these words and because URBEMIS2007 directly calculates ROG in place of VOC.

Air Quality Modeling

Construction and operational air quality impacts were calculated using the latest URBEMIS2007 air quality model, which was developed by CARB. URBEMIS2007 has been approved by SDAPCD and the City for construction and operation emission calculations. URBEMIS incorporates emission factors from the EMFAC2007 model for on-road vehicle emissions and the OFFROAD2007 model for off-road vehicle emissions.

Air pollutant emissions related to project traffic have the potential to create new, or worsen existing localized air quality with respect to CO. These increased carbon monoxide "Hot Spots" are determined through the utilization of the ITS Transportation Project-Level Carbon Monoxide Protocol (Caltrans 1998), as well as the City.

In the event the proposed project traffic adds vehicular trips to either an intersection that operates at Level of Service (LOS) E or F or any intersection where the project trips re-classifies the intersection level of service to LOS E or F and when peak-hour trips exceed 3,000 the Project must quantify CO levels (Source: County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements, March 2007).

Cancer Risk was determined for Diesel Particulate Matter (DPM) at the point of maximum exposure. The SCREEN3 dispersion model can be used to determine the 1-hour concentration for air pollutants at any location near the pollutant generator. Additionally, the model will predict the maximum exposure distance and concentration. Ldn Consulting utilized the worst case exhaust emissions generated from the project from construction equipment as calculated within the URBEMIS2007 model. The worst case cancer risk if exposed to a DPM dose for 70 years is defined as:

$$CR_{DPM} = C_{DPM} \times URF_{DPM}$$

Where, CR_{DPM} = Cancer risk from diesel particulate matter (probability on an individual developing Cancer.

C_{DPM} = Annual average DPM concentration in μg/m3 (SCREEN3 predicts a 1-hr concentration and is corrected to an annual average by multiplying the 1-hr average by 0.08.[3]

URF_{DPM} = The inhalation unit risk factor for diesel particulate was established by ARB as 300 in one million per continuous exposure of 1 μg/m3 of DPM over a 70-year period.[4]

5.3.3.2 Environmental Impacts

Violate any air quality standard or contribute substantially to an existing or projected air quality violation

Construction Emissions

Grading of the proposed project site will disturb roughly 74 acres of the 156-acre project site and would consist of clearing/grubbing, mass and finish grading and would be expected to last approximately five months long. As part of that work, the project engineer also expects that blasting operations will be

[3] U.S. EPA, 1992; ARB, 1994

[4] Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling emissions for CEQA Air Quality Analysis (August 2003)

necessary. The blasting operations would occur over a 10-day period with seven days of rock drilling and three days of blasting. During this operation, grading operations will occur simultaneously. It is expected that the balanced earthwork quantities will be 582,000 cubic yards (CY) with 27,000 CY developed from blasting.

After grading is complete, the project would start the trenching operations for wet and dry utilities and would last approximately 225 working days following with the commencement of building construction which would begin a three year process of building out the remainder of the proposed development.

Construction operations are expected to include three separate blasts which would include all the drilling necessary to place approximately 8,000-10,000 pounds (lbs) of ammonium nitrate. It is expected that drilling would occur for seven days and then three days of blasting. This operation is expected to occur during mass grading operations. Blasting operations usually require a chemical material that is capable of extremely rapid combustion resulting in an explosion or detonation. These materials are usually mixtures of several ingredients but are often oxygen deficient as combustion reactions take place which causes a formation of carbon monoxide and also to a lesser extent nitrogen oxides.

For ammonium nitrate and fuel oil (ANFO) mixtures, it is expected that carbon monoxide would be generated in quantities of 67 lbs per every ton of explosives and nitrogen oxides would be generated at 17 lbs per the same quantity.[5]

A summary of the construction emissions is shown in Table 5.3-5. As shown in Table 5.3-5, PM_{10} and $PM_{2.5}$ emissions would exceed SDAPCD air quality standards between the start of the project's grading period until the end of the grading period, and would require mitigation to comply during these activities. This impact would be limited to grading, trenching and fine grading only. No impacts are expected during the building construction activities phase of the project. Implementation of Mitigation Measure AQ-1 would reduce PM_{10} impacts during the grading period to a level less than significant.

Since blasting operations are expected to be concurrent with grading operations, it can be assumed that all grading equipment with respect to mass grading would be used on-site along with any ammonium nitrate blast operation proposed. Therefore, the impacts calculated and shown in Table 5.3-5 would be considered worst-case.

The proposed project is expected to utilize four to five tons of ammonium nitrate for a blast and would therefore generate up to 335 lbs of carbon monoxide and up to 85 lbs of nitrogen oxides on a given day of blasting. These quantities would be additive to the mass grading operations for the entire project site and could be added to the worst-case mass grading daily CO and NO_x output of 72.12 and 156.78 lbs identified in Table 5.3-5 which would be expected to increase the CO an NO_x outputs to 407.12 and 241.78, respectively. Based on these results, no impacts are expected for CO or NO_x.

[5] EPA-AP 42, Fifth Edition Compilation of Air Pollutant Emission Factors - www.epa.gov/ttn/chief/ap42/ch13/final/c13s03.pdf.

Table 5.3-5. Construction Emissions Summary

Year	ROG	NOx	CO	SO_2	PM_{10} (Dust)	PM_{10} (Exhaust)	PM_{10} (Total)	$PM_{2.5}$ (Dust)	$PM_{2.5}$ (Exhaust)	$PM_{2.5}$ (Total)
SDAPCD Thresholds (lb/ day)	*75*	*205*	*550*	*250*	-	-	*100*	-	-	*55*
2014 (lb/day) Unmitigated	18.48	156.78	72.12	0	752.62	6.07	758.69	157.18	5.59	162.77
Exceeds Screening Threshold	*No*	*No*	*No*	*No*	-	-	*Yes*	-	-	*Yes*
2014(lb/day) Mitigated	18.48	156.78	72.12	0	90	6.07	96.07	18.8	5.59	24.37
Exceeds Screening Threshold	*No*	*No*	*No*	*No*	-	-	*No*	-	-	*No*
2015 (lb/day) Unmitigated	28.23	78.86	94.54	0.08	0.4	4.47	4.87	0.14	4.09	4.24
Exceeds Screening Threshold	*No*	*No*	*No*	*No*	-	-	*No*	-	-	*No*
2016 (lb/day) Unmitigated	27.76	26.32	57.53	0.07	0.37	1.54	1.91	0.13	1.39	1.52
Exceeds Screening Threshold	*No*	*No*	*No*	*No*	-	-	*No*	-	-	*No*
2017 (lb/day) Unmitigated	27.32	24.06	54.19	0.07	0.37	1.37	1.74	0.13	1.24	1.38
Exceeds Screening Threshold	*No*	*No*	*No*	*No*	-	-	*No*	-	-	*No*
2018 (lb/day) Unmitigated	26.91	21.99	51.08	0.07	0.37	1.22	1.59	0.13	1.1	1.23
Exceeds Screening Threshold	*No*	*No*	*No*	*No*	-	-	*No*	-	-	*No*

Source: Air Quality Assessment 2012 (Appendix G).

Operational Emissions

As estimated in the traffic impact analysis for the proposed project, there will be 5,578 daily trips without any reductions due to the proposed/planned mass transit generated at full buildout of the Master Plan. The breakdown of the trips is provided in Section 5.14 of this EIR. These traffic numbers were used in the air quality model. The model also estimated emission predictions for ROG, NO_x, CO, SO_2, PM_{10}, and $PM_{2.5}$ for area source assumptions. It was assumed that 100 percent of the facilities will have access to natural gas and will be constructed with fireplaces equipped with natural gas burning logs. Additionally, it was assumed that an average of 5 percent of the structural surface area will be repainted each year.

The URBEMIS2007 Model was run for both the winter and summer scenario assuming an average winter temperature of 60ºF and an average summer temperature of 80ºF which would generate worst-case operational emissions. Average trip distances and mix ratios assumed within URBEMIS2007 are considered typical for the proposed project scenario.

The expected daily pollutant generation can be calculated utilizing the product of the average daily miles traveled and the expected emissions inventory calculated by EMFAC2007; URBEMIS2007 performs this

calculation. The daily pollutants calculated are shown in Table 5.3-6. Based upon these calculations, the proposed project will not exceed SDAPCD significance thresholds and the impact is less than significant.

Table 5.3-6. Operation Emissions Summary

	ROG	NOx	CO	SO_2	PM_{10}	$PM_{2.5}$
Summer Scenario						
Area Source Emission Estimates (lb/Day)	36.91	9.39	15.44	0	0.06	0.06
Operational Vehicle Emissions (lb/Day)	29.46	38.14	333.69	0.43	81.66	15.76
Total (lb/Day)	66.37	47.53	349.13	0.43	81.72	15.82
SCAQMD Thresholds	*75*	*250*	*550*	*250*	*100*	*55*
Significant?	*No*	*No*	*No*	*No*	*No*	*No*
Winter Scenario						
Area Source Emission Estimates (/b/Day)	35.69	13.21	5.63	0.03	0.34	0.34
Operational Vehicle Emissions (lb/Day)	30.82	45.62	321.84	0.41	81.66	15.76
Total (lb/Day)	66.51	58.83	327.47	0.44	82	16.1
SCAQMD Thresholds	*75*	*250*	*550*	*250*	*100*	*55*
Significant?	*No*	*No*	*No*	*No*	*No*	*No*

Source: Air Quality Assessment 2012 (Appendix G).

Based on review of the project traffic study, the proposed project would not cause either existing or near term intersections to operate LOS E or worse and would not be required to conduct a Hot Spot Analysis (Traffic Impact Analysis 2012). Therefore, the impact is less than significant.

Expose sensitive receptors to substantial pollutant concentrations

As identified above, temporary construction emissions would exceed the SDAPCD for PM_{10} and $PM_{2.5}$. Mitigation Measure AQ-1 would reduce the temporary impact to a less than significant level. Operational emissions would not exceed the SDAPCD thresholds, and are less than significant.

Health Risk

Diesel Exhaust

Based on the air quality modeling, the worst-case PM_{10} from exhaust could be as high 6.07 lbs per construction day (8-hours) during the expected grading phase including blasting (Table 5.3-5 above). This was assumed over the entire construction period as a worst-case assumption.

The emissions would be 0.0247 grams per second DPM during the construction day which would be expected to be distributed over the disturbed project area of 74 acres. Converting pounds per day (lb/day) to grams per second is shown below:

$$\frac{6.07 \text{ lb/day} * 453 \text{ grams/lb}}{28{,}800 \text{ seconds/construction day}} = 0.0954 \text{ grams/second}$$

The average emission rate over the grading area is 6.7802x10-5 g/m2/s, which was calculated as follows:

$$\frac{0.0954 \text{ grams/second}}{74 \text{ acres} * 4{,}406 \text{ meters}^2/\text{acre}} = 3.19 * 10^{-7} \text{ grams/meters}^2/\text{second}$$

Utilizing the SCREEN3 dispersion model, the peak maximum 1-hr concentration is 11.55 µg/m3 during the worst-case construction period. Converting the peak 1-hr concentration to an annual concentration reduces the concentration to 0.924 µg/m3. Therefore, utilizing the risk equation identified above and calculating the cancer risk over a 70 year continuous dose would be:

$$CR_{DPM}\text{-70yr dose} = 0.0003 \text{ x } 0.924 = 0.000277$$

The numerical number of individuals exposed to DPM of this concentration from the project would be less than one in one million and is not considered an impact. The SCREEN3 dispersion model outputs are provided in Appendix G of this EIR.

Crystalline Silica

Crystalline silica is a basic component of soil, sand, granite, and many other minerals. Quartz is the most common form of crystalline silica but other forms include cristobalite and tridymite. All three forms may become respirable size particles when workers chip, cut, drill, or grind objects that contain crystalline silica.[6]

The Occupational Safety Health Administration (OSHA) has an established Permissible Exposure Limit, or PEL, which is the maximum amount of crystalline silica to which workers may be exposed during an 8-hour work shift (29 CFR 1926.55,1910.1000). OSHA also requires hazard communication training for workers exposed to crystalline silica, and requires a respirator protection program until engineering controls are implemented. Additionally, OSHA has a National Emphasis Program (NEP) for crystalline silica exposure to identify, reduce, and eliminate health hazards associated with occupational exposures.

The contractor is required to follow OSHA requirements with respect to workers safety to exposure to silica dust and would therefore not be an impact on-site. Off-site impacts from crystalline silica are not expected given the contractor will be watering the entire site twice daily and installing vegetation on the site as soon as the desired grades are achieved.

Result in a cumulatively considerable net increase of any criteria pollutant

From a construction perspective, there is a potential to create a cumulative impact if the propose project is both simultaneously constructed alongside an adjacent construction project or a project where project emission contours overlap. These scenarios would cumulatively cause emissions to exceed SDAPCD emission thresholds. The project traffic study identifies nine projects within the general area around the project site:

1) El Corazon Specific Plan (7,960 average daily traffic [ADT])
2) Tri-City Medical Office Building (3,000 ADT)

[6] http://www.osha.gov/Publications/osha3177.pdf

3) Plaza Camino Real Westfield Shopping Center Revitalization Project (5,186 ADT from vacant leasable space; 1240 ADT from new space)
4) Carlsbad High School (1,950 ADT)
5) Robertson Ranch (17,800 ADT)
6) Holly Springs Catarini (2,250 ADT)
7) Dos Colinas (1,340 ADT)
8) Palomar Airport Road Commons (12,370 ADT)
9) La Costa Town Square (25,516 ADT)

The SCEEN3 dispersion model estimates that worst-case emissions would be generated at 387 meters from the project center. None of the identified cumulative projects are within the proposed Quarry Creek project emission contour; however, worst-case contours are not known for nearby cumulative projects. It is estimated that the worst-case contour for any of the listed cumulative projects would not have emission contours exceeding 1,000 meters. Therefore, any project over 1,387 meters from the project would not cumulatively be expected to add or contribute to emissions generated from the proposed project. Given this, none of the identified projects are located within the 1,387 meter contour line and no cumulative construction impacts are expected.

Also, based on a review of the cumulative plus project traffic projections, the proposed project would not add vehicular trips or reclassify any intersections to a level of service to LOS E or F. Therefore, no cumulative operational CO impacts are expected. Given this, combined with the conclusion that no operational impacts are expected, the project would also comply with the RAQS and the State Implementation Plan (SIP), and would not result in a cumulatively considerable net increase of any criteria pollutant.

Conflict with or obstruct implementation of the RAQS or applicable portions of the SIP

Based on a review of the cumulative plus project traffic projections, the proposed project would not add vehicular trips or re-classify any intersections to a level of service to LOS E or F. Therefore, no cumulative operational CO impacts are expected. Give this and combined with the conclusion that no operational impacts are expected, the project would also comply with the RAQS and the SIP.

Create objectionable odors affecting a substantial number of people

The inhalation of VOCs causes smell sensations in humans. There are four primary ways in which these odors can affect human health:

- VOCs can produce toxicological effects;
- The odorant compounds can cause irritations in the eye, nose, and throat;
- VOCs can stimulate sensory nerves that can cause potentially harmful health effects; and
- The exposure to perceived unpleasant odors can stimulate negative cognitive and emotional responses based on previous experiences with such odors.

Development of the proposed project site could generate trace amounts of substances such as ammonia, carbon dioxide, hydrogen sulfide, methane, dust, organic dust, and endotoxins. Additionally, proposed

on-site uses could generate such substances as volatile organic acids, alcohols, sulfides, and fixed gases. Odor generation impacts due to the project are not expected to be significant since any odor generation would be intermittent and would terminate upon completion of the construction phase of the project. As a result, no significant air quality impacts are expected to surrounding residential receptors. Odor impacts from construction operations would be considered short term events and are not considered a significant impact.

Off-site Improvements

Implementation of the proposed project will involve the construction of off-site improvements as described in EIR Section 3.0. Short-term air emissions associated with the construction of off-site improvements is included in the overall estimate of construction emission impacts, as presented in the air quality analysis. As shown in Table 5.3-5, PM_{10} and $PM_{2.5}$ emissions would exceed SDAPCD air quality standards between the start of the project's grading period until the end of the grading period, and mitigation would be required to comply with air quality thresholds during construction activities. The short-term air quality impact would be limited to the grading, trenching, and fine grading phases of off-site improvement construction. Implementation of Mitigation Measure AQ-1 would reduce impacts to a level less than significant. Once, constructed, the off-site improvements would not result in operational criteria pollutant emissions.

5.3.4 Level of Significance Before Mitigation

Construction activities will result in a temporary significant impact with regards to PM_{10} and $PM_{2.5}$ emission in excess of the SDAPCD thresholds. Implementation of Mitigation Measure AQ-1 is required.

5.3.5 Environmental Mitigation Measures

AQ-1 Prior to issuance of a grading permit, the project applicant shall prepare a dust control measure plan that includes Best Available Control Measures (BACM) that are designed to reduce PM_{10} emissions. The dust control plan shall be submitted to the City of Carlsbad Engineering Department for review and approval. The following standards for construction emissions shall be implemented during construction:

- Apply water during grading (which includes blasting activity)/grubbing activities to all active disturbed areas at least twice daily;
- Apply non-toxic soil stabilizers according to manufacturer's specification to all inactive construction areas (previously graded areas inactive for ten days or more);
- Apply water to all on-site unpaved roadways at least two times daily; and
- Reduce all construction related traffic speeds on-site to below 15 miles per hour (MPH).

5.3.6 Level of Significance After Mitigation

Implementation of Mitigation Measures AQ-1 would reduce the short-term construction related air quality impact to a level less than significant. No significant long-term operational air quality impacts have been identified.